

WHAT IS CLAIMED IS:

1. A millimeter wave transmitter for performing millimeter wave radio transmission indoors, comprising:

a connection unit connectable with an antenna receiving a plurality of broadcasting waves;

a power supply circuit supplying driving power to said antenna through said connection unit;

a broadcasting wave input circuit receiving said plurality of broadcasting waves through said connection unit and converting said broadcasting waves to broadcasting signals corresponding to said broadcasting waves respectively;

a broadcasting wave modulation circuit up-converting said broadcasting signals to millimeter waves to be transmitted/received indoors; and

a millimeter wave transmission circuit transmitting said millimeter waves.

2. The millimeter wave transmitter according to claim 1, wherein said millimeter waves are radio waves of the 60 GHz band.

3. The millimeter wave transmitter according to claim 1, wherein said broadcasting waves include at least one of radio waves of the radio frequency band of terrestrial waves and radio waves of an intermediate frequency band of satellite broadcasting.

4. The millimeter wave transmitter according to claim 1, further comprising:

a frequency arranging circuit changing the frequency arrangement of said broadcasting signals.

5. The millimeter wave transmitter according to claim 1, further comprising:

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5 a video/audio signal processing circuit producing at least one of a video signal and an audio signal on the basis of internal information of said millimeter wave transmitter,

a modulation circuit modulating said signal produced by said video/audio signal processing circuit to a broadcasting wave receivable in an electronic apparatus having a function of receiving broadcasting, and

10 a mixing circuit mixing an output wave from said modulation circuit with said broadcasting waves input through said connection unit.

6. The millimeter wave transmitter according to claim 1, further comprising:

an input interface inputting at least one of a video signal and an audio signal from outside,

5 a modulation circuit modulating said signal input in said input interface to a broadcasting wave receivable in an electronic apparatus having a function of receiving broadcasting, and

a mixing circuit mixing an output wave from said modulation circuit with said broadcasting waves input through said connection unit.

7. The millimeter wave transmitter according to claim 1, further comprising:

a receiver for receiving a remote control signal from an electronic apparatus having a function of receiving broadcasting.

8. A millimeter wave transmitter for performing millimeter wave radio transmission indoors, comprising:

a broadcasting wave input circuit receiving a plurality of broadcasting waves and converting said broadcasting waves to broadcasting signals corresponding to said broadcasting waves respectively;

a broadcasting wave modulation circuit up-converting said broadcasting signals to millimeter waves to be transmitted/received indoors;

a millimeter wave transmission circuit transmitting said millimeter

10 waves; and

a receiving circuit receiving an external control signal.

9. The millimeter wave transmitter according to claim 8, further comprising:

a connection unit connectable with an antenna receiving said plurality of broadcasting waves, and

5 a power supply circuit supplying driving power to said antenna through said connection unit, wherein

said broadcasting wave input circuit receives said plurality of broadcasting waves through said connection unit, and

10 said power supply circuit operates on the basis of said external control signal.

10. The millimeter wave transmitter according to claim 8, further comprising:

5 a power control circuit controlling execution/interruption of power supply to a plurality of circuits included in said millimeter wave transmitter.

11. The millimeter wave transmitter according to claim 10, further comprising:

a utilized apparatus storage circuit storing identification information input from said receiving circuit, wherein

5 said identification information indicates identification information of an electronic apparatus utilizing output signals from said millimeter wave transmitter, and

said power control circuit operates on the basis of said identification information.

12. A millimeter wave receiver for performing millimeter wave radio transmission indoors, comprising:

a millimeter wave receiving circuit receiving millimeter waves,

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obtained by up-converting a plurality of broadcasting waves, to be
transmitted/received indoors;

a broadcasting wave demodulation circuit down-converting said
millimeter waves to the frequency band of said broadcasting waves;

a connection unit connectable with a connector provided on an
electronic apparatus having a function of receiving broadcasting; and

a power receptor circuit receiving driving power of said millimeter
wave receiver through said connection unit.

13. The millimeter wave receiver according to claim 12, wherein
said millimeter waves are radio waves of the 60 GHz band.

14. The millimeter wave receiver according to claim 12, wherein
said broadcasting waves include at least one of radio waves of the
radio frequency band of terrestrial waves and radio waves of an
intermediate frequency band of satellite broadcasting.

15. The millimeter wave receiver according to claim 12, further
comprising:

an input connector connected with an external antenna receiving
said plurality of broadcasting waves, and

a mixing/switching circuit outputting one of said broadcasting waves
received by said input connector, output signals from said demodulation
circuit, and signals obtained by mixing said broadcasting waves and said
output signals.

16. The millimeter wave receiver according to claim 12, further
comprising:

a frequency arranging circuit changing the frequency arrangement of
output signals from said broadcasting wave demodulation circuit.

17. The millimeter wave receiver according to claim 12, further
comprising:

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a video/audio signal processing circuit producing at least one of a video signal and an audio signal on the basis of internal information of said millimeter wave receiver,

a modulation circuit modulating said signal produced by said video/audio signal processing circuit to a broadcasting wave receivable in said electronic apparatus, and

a mixing circuit mixing an output wave from said modulation circuit with said broadcasting waves input through said connection unit.

18. The millimeter wave receiver according to claim 12, further comprising:

a plurality of output terminals, and

a distribution circuit for distributing output signals from said broadcasting wave demodulation circuit to each of said plurality of output terminals.

19. The millimeter wave receiver according to claim 12, wherein said connection unit is capable of at least one of rotation and bending when connected with said connector, and

said millimeter wave receiving circuit includes at least one millimeter wave antenna having a variably settable direction.

20. The millimeter wave receiver according to claim 19, wherein said connection unit is capable of said rotation when connected with said connector,

said millimeter wave receiving circuit includes a millimeter wave antenna arranged substantially in parallel with the axis of said rotation, and

said millimeter wave antenna has a receiving surface rotatable about the axis of said rotation.

21. The millimeter wave receiver according to claim 20, wherein said connection unit is capable of said rotation when connected with

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said connector,

said millimeter wave receiving circuit includes:

5 a first millimeter wave antenna arranged substantially in parallel with the axis of said rotation, and

a second millimeter wave antenna arranged substantially perpendicularly to the axis of said rotation, and

10 each of said first and second millimeter wave antennas has a receiving surface rotatable about the axis of said rotation.

22. The millimeter wave receiver according to claim 19, wherein said connection unit is capable of said rotation when connected with said connector,

5 said millimeter wave receiving circuit includes a millimeter wave antenna obliquely arranged with respect to the axis of said rotation, and

said millimeter wave antenna has a receiving surface rotatable about the axis of said rotation.

23. The millimeter wave receiver according to claim 19, wherein said connection unit is capable of said rotation on a first axis of rotation when connected with said connector,

5 said millimeter wave receiving circuit includes a millimeter wave antenna having a second axis of rotation in a direction substantially perpendicular to said first axis of rotation, and

said millimeter wave antenna has a receiving surface rotatable about said second axis of rotation.

24. The millimeter wave receiver according to claim 19, further comprising:

5 a receiving level detection circuit determining the receiving level in said millimeter wave receiving circuit and outputting a signal responsive to the result of determination,

a video/audio signal processing circuit producing at least one of a video signal and an audio signal as information signal for indicating a

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receiving state to said electronic apparatus,

10 a modulation circuit modulating said signal produced by said video/audio signal processing circuit to a broadcasting wave receivable in said electronic apparatus, and

a mixing circuit mixing said broadcasting wave output from said modulation circuit and said broadcasting waves input through said connection unit, wherein

15 said video/audio signal processing circuit changes said information signal in response to said output of said receiving level detection circuit.

25. The millimeter wave receiver according to claim 24, further comprising:

a display unit capable of making display responsive to said output of said receiving level detection circuit, and

5 said display unit executes said display also when said millimeter wave receiver is disconnected from said connector.

26. The millimeter wave receiver according to claim 12, further comprising:

a control signal receiving circuit receiving a control signal from said electronic apparatus through said connection unit.

27. The millimeter wave receiver according to claim 26, further comprising:

a transmission circuit transmitting a control signal for controlling a millimeter wave transmitter outputting said millimeter waves.

28. The millimeter wave receiver according to claim 27, wherein said transmission circuit transmits the control signal received from said electronic apparatus to said millimeter wave transmitter.

29. The millimeter wave receiver according to claim 26, further comprising:

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a power control circuit controlling execution/interruption of power supply to a plurality of circuits included in said millimeter wave receiver, wherein

said power control circuit interrupts power supply to said plurality of circuits included in said millimeter wave receiver when said control signal receiving circuit receives a receiving interruption signal from said electronic apparatus.

30. The millimeter wave receiver according to claim 12, further comprising:

a receiving circuit receiving an external control signal.

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31. The millimeter wave receiver according to claim 30, wherein said millimeter waves are output from a millimeter wave transmitter, the millimeter wave receiver further comprising a transmission circuit transmitting a control signal for controlling said millimeter wave transmitter.

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32. The millimeter wave receiver according to claim 30, further comprising:

a power control circuit controlling execution/interruption of power supply to a plurality of circuits included in said millimeter wave receiver, wherein

said power control circuit interrupts power supply to said plurality of circuits included in said millimeter wave receiver when said receiving circuit receives a receiving interruption signal from said electronic apparatus.

33. The millimeter wave receiver according to claim 12, wherein said millimeter wave receiving circuit includes a non-directional antenna for receiving millimeter waves.

34. The millimeter wave receiver according to claim 33, further

comprising:

a control signal receiving circuit receiving a control signal from said electronic apparatus through said connection unit.

35. The millimeter wave receiver according to claim 34, further comprising:

a transmission circuit transmitting a control signal for controlling a millimeter wave transmitter outputting said millimeter waves.

36. The millimeter wave receiver according to claim 34, further comprising:

a power control circuit controlling execution/interruption of power supply to a plurality of circuits included in said millimeter wave receiver, wherein

said power control circuit interrupts power supply to said plurality of circuits included in said millimeter wave receiver when said receiving circuit receives a receiving interruption signal from said electronic apparatus.

37. An electronic apparatus capable of utilizing an output signal from a millimeter wave receiver, comprising:

a connector connected with said millimeter wave receiver;

a memory circuit storing information as to whether or not to utilize said output signal from said millimeter wave receiver in correspondence to a channel subjected to selection for receiving; and

a power supply circuit supplying driving power of said millimeter wave receiver through said connector, wherein

said power supply circuit supplies said driving power through said connector when a channel utilizing said output signal from said millimeter wave receiver is selected on the basis of said information stored in said memory circuit.

38. An electronic apparatus capable of utilizing an output signal

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from a millimeter wave receiver, comprising:

- a connector connected with said millimeter wave receiver; and
 - a control signal transmission circuit transmitting a control signal
- 5 indicating information provided in said electronic apparatus to said connector.

39. An electronic apparatus capable of utilizing an output signal from a millimeter wave receiver, comprising:

- a connector connected with said millimeter wave receiver;
 - a memory circuit storing information as to whether or not to utilize
- 5 said output signal from said millimeter wave receiver in correspondence to a channel subjected to selection for receiving; and
- a control signal transmission circuit transmitting a control signal responsive to said information stored in said memory circuit to said connector.

40. An electronic apparatus having a function of receiving television broadcasting, comprising:

- a millimeter wave receiving circuit receiving millimeter waves, obtained by up-converting a plurality of broadcasting waves, output from a
- 5 millimeter wave transmitter;
- a broadcasting wave demodulation circuit down-converting said millimeter waves to the frequency band of said broadcasting waves;
 - an inverse frequency arranger changing the frequency arrangement of output signals of said broadcasting wave demodulation circuit; and
- 10 a transmission circuit transmitting a control signal for controlling said millimeter wave transmitter.

41. A repeater connected to an antenna receiving broadcasting for making a relay to a terminal, comprising:

- a broadcasting wave input circuit receiving a plurality of broadcasting waves through said antenna and converting said broadcasting
- 5 waves to broadcasting signals corresponding to said broadcasting waves

respectively;

a frequency arranging circuit changing the frequency arrangement of said broadcasting signals;

a power supply circuit supplying power to said antenna;

a connection unit for connection with said terminal; and

a power receptor circuit receiving driving power of said repeater through said connection unit.

42. The repeater according to claim 41, further comprising:

a control signal receiver receiving a control signal from said terminal through said connection unit.

43. A millimeter wave communication system for performing millimeter wave radio transmission indoors, comprising:

a millimeter wave transmitter for transmitting millimeter wave signals in said millimeter wave radio transmission, said millimeter wave transmitter including:

a first connection unit connectable with an antenna receiving a plurality of broadcasting waves,

a power supply circuit supplying driving power to said antenna through said first connection unit,

a broadcasting wave input circuit receiving said plurality of broadcasting waves through said first connection unit and converting said broadcasting waves to broadcasting signals corresponding to said broadcasting waves respectively,

a broadcasting wave modulation circuit up-converting said broadcasting signals to said millimeter wave signals to be transmitted/received indoors, and

a millimeter wave transmission circuit transmitting said millimeter wave signals; and

a millimeter wave receiver receiving said millimeter wave signals in said millimeter wave radio transmission, said millimeter wave receiver including:

a millimeter wave receiving circuit receiving said millimeter wave signals,

25 a broadcasting wave demodulation circuit down-converting said millimeter wave signals to the frequency band of said broadcasting waves,

a second connection unit connectable with a connector provided on an electronic apparatus having a function of receiving broadcasting waves, and

30 a power receptor circuit receiving driving power of said millimeter wave receiver through said second connection unit.

44. A millimeter wave communication system for performing millimeter wave radio transmission indoors, comprising:

a repeater connected to an antenna receiving broadcasting for relaying a plurality of broadcasting waves, said repeater including:

5 a broadcasting wave input circuit receiving said plurality of broadcasting waves through said antenna and converting said broadcasting waves to broadcasting signals corresponding to said broadcasting waves respectively,

10 a frequency arranging circuit changing the frequency arrangement of said broadcasting signals,

a first power supply circuit supplying driving power to said antenna, and

15 a first connection unit connectable with an external apparatus; a first power receptor circuit receiving driving power of said repeater through said first connection unit;

a millimeter wave transmitter for receiving output signals of said repeater and transmitting millimeter wave signals in said millimeter wave radio transmission, said millimeter wave transmitter including:

20 a second connection unit connected with said first connection unit, a second power supply circuit supplying driving power to said repeater through said first and second connection units,

a broadcasting wave modulation circuit receiving said broadcasting signals through said first and second connection units and up-converting

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25 said broadcasting signals to millimeter wave signals to be transmitted/received indoors, and

a millimeter wave transmission circuit transmitting said millimeter wave signals; and

30 a millimeter wave receiver for receiving said millimeter wave signals in said millimeter wave radio transmission, said millimeter wave receiver including:

a millimeter wave receiving circuit receiving said millimeter wave signals,

35 a broadcasting wave demodulation circuit down-converting said millimeter wave signals to the frequency band of said broadcasting waves,

a third connection unit connectable with a connector provided in an electronic apparatus having a function of receiving broadcasting waves, and

a second power receptor circuit receiving driving power of said millimeter wave receiver through said third connection unit.

45. The millimeter wave communication system according to claim 44, wherein

5 said millimeter wave transmitter further includes a control signal transmission circuit transmitting a control signal through said second connection unit.